Machine Translation of the Disclosure of EP1216910

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[0001] The invention relates to a conveyor, in particular an electrical overhead conveyor, to the conveyance of items also

a) a way system, in particular a mounting rail system;
b) a plurality of carriages, which are more movable guided and in each case exhibit a drive motor on the way system;
c) a central control, which steers the movement of the carriages on the way system and coordinated; how
d) the way system at least a location exhibits, at which an influencing control is required on a carriage located in this place.

[0002] Conveyors of this type become the conveyance of most different items, in particular also used to the conveyance of vehicle bodies in Lackieranlagen. With known embodiments of electrical overhead conveyors, which belong to these conveyors, the entire mounting rail system is by rail cuts into single "blocks" divided, becomes placed to which by the central control the operating voltage in each case, with which the drive motors of carriage operated located in the questionable block to become to be supposed. This known type of the car price increase is very expensive, since rail cuts are very expensive and the wiring expenditure is significant. Beyond that are such known electrical overhead conveyors very much inflexible, since the locations, possible at which an influencing control is on the carriages, are by the rail cuts predetermined. If these locations are to become displaced, the introduction of new rail cuts and the cancellation of present rail cuts are required. Repair and maintenance works at the rail cuts are very time-intense.

[0003] Similar problem definitions result also in the case of other rail-bound conveyors and in the case of conveyors, guided not in which the carriages are by rails however by another guide means in their direction, for example in the case of transport systems without driver, which follow on wheels of an inductance loop let in into the ground.

[0004] To out-arrange object instant invention is it, conveyor the initially mentioned type so that it is overall inexpensive and flexible regarding the locations, possible at which an influencing control is on the carriages.

[0005] This object becomes according to invention dissolved by the fact that

a) the way system at the locations, is required at which an influencing control on the carriages, an code-inertial exhibits, which carries a selectable, a certain action of the carriage for coding code;
f) each carriage exhibits:

company) a code reading device, which with that code-inertial cooperates;
fb) a car price increase, which evaluates the signals of the code reading device and which from the received code coded action of the carriage releases.

[0006] A conveyor according to invention becomes thus controlled by an open control system, which Programmnoner makes changes of parameter over standardisierte procedures possible. If the conveyor is formed as electrical overhead conveyor, the entire mounting rail system can be continuous, thus without rail cuts, performed. In which manner the single carriages located on the mounting rail system convert the there removable operating voltage, depends on the informations, which becomes transmitted of along the mounting rail system arranged code carriers to the carriages. So that can contain code-inertial for example a code, one stopping the carriage coded. If a certain carriage at this code-inertial arrives and if the questionable code is selected by the code reading device of the carriage, the so identified car price increase the command predetermined by the code and stops therefore the drive motor of the carriage. In similar manner other actions, for example the deceleration of the speed of the respective carriage, can become by the car price increase caused. The system is extraordinary flexible, there the mounting of a code carrier at any location of the mounting rail system - also additional - possible is. Likewise already placed code-inertial can become easily removed or offset. In last cases become the corresponding actions at another location of the way system performed, coded of the questionable codes. The wiring expenditure with seem-ind plants is significantly reduced, since no longer single sections of the entire rail system separate fed to become to have. Also repairs or other maintenance works are to be accomplished simple and inexpensive.

[0007] With a particularly prefered enbettiment of the conveyor according to invention communicated each car price increase over a data bus with the central control. Each car price increase can convey thus informations to the central control and also commands of the central control obtained. For example the central control can convey the command to a certain carriage, which became the standstill brought, to take up the travel again.

[0008] Each car price increase appropriately is over a sliding contact with the data bus formed as Schleifleitung in connection. The data bus needs to be shifted thus only essentially parallel to that the operating voltage leading

Schleifleitung along the way system

[0009] Particularly troublefree also in dirty environments an embodiment of the invention works, with which that code-inertial a transponder, which exhibits a memory, is covered, in which the code stored, and with which the code reading device sends one/to receipt mechanism enclosure, which queries the transponder

⊛ top [0010] Alternative one can become in such environments, in which the danger of pollution is smaller, also an code-inertial used, which carries a bar code, whereby the code reading device exhibits a bar code read head. Such bar code read heads are inexpensive available on the market.

[0011] Furthermore prefered one becomes, if each carriage exhibits a distance sensor, that the distance of the leading carriage monitored. With the help of such distance sensors the coordination of the car movements on the way system can be completed to a large extent without engagements of the central control. If the distance sensor responds and thereby if falling below a certain minimum distance indicates to the leading carriage, that implemented, then so far, are overacted the movement of the questionable carriage of controlling commands in such a way that the minimum distance is kept to the leading carriage.

[0012] In some cases it is required to introduce a certain action of the carriage at a very accurate defined location within the way system. Perhaps then the local dissolution, with which code-inertial and code reading device work, for itself is not sufficient alone. In this case an embodiment of the invention becomes used, with which at the questionable locations of the mounting rail system except that code-inertial is a local marking arranged and with which each carriage with corresponding sensor is provided, which cooperates with the local marking, whereby the action, which becomes coded by the code transmitted of the code reading device to the car price increase, becomes only then performed if the sensor responded to the local marking. Sensor and local markings are available with very large local dissolution. With this embodiment of the invention thus recognizing a code does not release the immediate respective action by the code reading device yet; rather for this required is as the second condition that the sensor emits an appropriate signal. Thereby is safe provided that the questionable action with high precision at the desired location becomes caused

[0013] In the simplest case the local marking can consist of a piece metal sheet. Alternative one can act it thereby around a field with a bright one/a dark border.

[0014] Prefered one becomes an other embodiment of the invention, with which each car price increase contains a controller with memory, in codes and from the code of coded actions stored is and corresponding verified becomes. Then the car price increase can accomplish autonomous actions, if you became a certain code transmitted, without having to communicate with the central controller.

[0015] With way systems, which extend over longer removals, embodiment of the conveyor according to invention used are subordinate with which the central control several range CONTROLLERs, over which certain portions of the way system managed will in each case become.

[0016] The code recognition can, as already above described, already in the single car price increases to take place. Additional one or alternative is it however also possible that the central control and/or the range CONTROLLERs contain a memory, in which the codes coded actions stored is. In this case transmitted thus each car price increase over the data bus their code to the central control, contained of. This the identified action, which becomes coded of the questionable code, and sends again over the data bus a command to the car price increase, becomes triggered with which the einnsprechende action.

[0017] Preferably the conveyor covers a free manageable code-inertial, in which the characteristic data of a carriage is storable and which cooperates with the code reading device of a new carriage introduced into the conveyor to its initialization in the system. In this way about defective, carriages taken out of the system light can be replaced by another carriage. This keeps the characteristic data and informations over the questionable, free manageable code-inertial, required to its integration into the overall system, read in. This can become without special knowledge of each operator safe performed. Each carriage always leads its initial-they-run-gs-code-inertial in a corresponding receptacle with itself, so that it is at any time at hand; with initialization of a new carriage the for this used code-inertial becomes given into the receptacle of the new carriage.

[0018] An embodiment of the invention becomes subsequent more near explained on the basis the drawing; show

Fig 1 in the side view a cutout of the support rail of an electrical overhead conveyor, on which a carriage is,
Fig 2 in enlarged yardstick and isometric of oblique down a cutout of fig 1 in the area of the front car end,
Fig 3 the block diagram of the control of the electrical overhead conveyor

[0019] In the figs 1 and 2 is with the numeral 1 the support rail of an electrical overhead conveyor designated, which is suspended over a not represented support structure at a building or a structural steelwork. On the support rail 1 the bottom control of a control, which becomes other down more near described, several carriages 2 move, of which in fig 1 of a shown is. Everyone this carriage 2 possesses a front drive assembly 3 as well as a rear drive assembly 4, which is at the support rail 1 through not represented rollers guided and at those below the support rail 1 a more longitudinal, the drive assemblies 3 and 4 interconnecting load carrier 5 fixed is. The load carrier 5 exhibits two fasteners 6, 7, at which the load which can be promoted can become fixed.

[0020] The front drive assembly 3 carries the drive motor 8, which affects over a transmission 9 a not represented drive pulley of the front drive assembly 3. In addition at a side of the front drive assembly 3 a box is 10 fixed, in which those is other down more near explained dare-lateral control. A cable 11 leads this from the box 10 to the drive motor 8 and supplied with current.

[0021] Inside the front drive assembly 3 are in addition current collectors, which are not more discernible in the drawing and in sliding contact with Schleifleitungen 13, 14, which are 1 fixed on the side of the support rail. The Schleifleitung 13 leads the operating voltage for the drive motor 8, while the Schleifleitung is 14 formed as CAN bus, across which into still the car price increase with the central control of the electrical overhead conveyor.

accommodated to descriptive manner in the box 10, communicate can.

[0022] At the front end of the carriage 2 is a precursor 15, who exhibits itself with a type nose below the support rail 1 forward extended and at its foremost end a rubber buffer 16. In addition at the precursor 15 is in Distance sensor 17 fixed, which is more pivotable in each case the distance 2 monitored to the CAN bus 14 are for representation reasons for better "illuminating" of the distance section located before the carriage 2 with driving along curves around a vertical axis. Finally a code reading device is 18 arranged, which is in short distance below the underside of the support rail 1 extended at the precursor 15. The code reading device 18 communicated in still transponders 21 as well as local markings 20 mounted to descriptive manner also at the underside of the support rail 1.

[0023] At the rear end of each carriage 2 is a trailer 21, which carries a cleat 22 at its rear end. The cleat 22 catches if necessary the impact of the rubber buffer 16 of a subsequent carriage 2 up.

[0024] A reflector 23, which can be in the top plan view from above arcuate curved, the reflected radiation to this distance sensor 17, emitted of the distance sensor 17 of the running after carriage 2, back and facilitated in this way the spacer monitoring.

[0025] The multiplicity of carriage 2, which moves on the support rail 1, becomes controlled of a control, which is schematic in fig 3 as block diagram shown.

[0026] In fig 2 2 is to recognize the support rail 1 as well as at their underside mounted transponders 21 and the local marking the 20 from the figs 1 and. The Schleifleitung 13 as well as the CAN bus 14 are for representation reasons detached by the support rail 1 shown, at that it actual, how mentioned above, fixed are.

[0027] In switchgear cabinet 24 is central control (SPS) 25, which is with larger plants over range CONTROLLER 26, from which a shown is, to the CAN bus 14 connected. In addition the backup 27 as well as the switch 28 for the operating voltage located on the Schleifleitung 13 are contained in the central switchgear cabinet 24.

[0028] How already mentions, each carriage 2 exhibits own car price increase 29. These communicated over a sliding contact 30 with the CAN bus 14. In addition the car price increase 29 the output signals of one become send/receipt mechanism 32, which with the transponders 21 communicated, a sensor 33, that with the local markings 20 communicated, as well as the distance sensor 17 supplied, mounted mounted at the support rail 1, at the support rail 1. The car price increase 29 bestromt the drive motor 8 the corresponding it supplied signals and caused if necessary other functions, for example the twist of the distance sensor 17 around the vertical axis.

[0029] The transponder 21 contains a memory, is stored on which a certain code, as well as a circuit, which is in the layer, sends of/receipt mechanisms 32 of the various carriages 2 emitted test pulse to recognize, thereupon the code from the memory to select and as acknowledgement signal to send/receipt mechanism back 32 to send. This circuit arrangement can become so designed that it sends its energy requirement from the interrogation signal/scoops receipt mechanism 32, thus no separate battery required.

[0030] During the local marking 20 it can concern a simple sheet, which can become of an Retail responsive sensor 33 particularly good recognized. Alternative one can become for example a marking field used, which exhibits a bright one/a dark border, which becomes from optical sensor a scanned

[0031] The transponders 21 and the local markings 20 are 1 arranged at those locations along the support rail, at which controlling is to be affected the carriage 2 passing this location. So transponder 21 and local markings can become 20 for example at the beginning of distance sections arranged, in which the speed of the carriages is to become 2 reduced on a smaller value, as well as at such locations, where the speed can become an increased value raised. Attachment places for transponder 21 and local markings 20 are for example in addition positions, at which the carriages 2 are to come to the standstill.

[0032] The operation of the described electrical overhead conveyor is the subsequent, whereby assumed is to become that the carriages 2 at the attachment place of the represented transponder 21 and/or. the local markings 20 to the standstill to come are.

[0033] The considered carriages 2 approaches to the questionable location coming into fig 1 from left, until the continuous test pulses sending sends/moves to receipt mechanism 32 into the receiving area of the transponder 21, the transponder 21 answers now to a test pulse with a corresponding acknowledging impulse, with that it its code of the car price increase 29 transmitted. The car price increase 29 white either from an own memory or by the communication with the range CONTROLLER 26 and the central control 25 over the bus 14, which is to be arranged with exception of this code. However the car price increase 29 does not implement this command first, there the type of the communication between sends/receipt mechanism 32 and the transponder 21 still no sufficient local resolution permitted. The embodiment of the command becomes by the car price increase 29 only then enabled therefore even if the sensor 33 the local marking 20 detected and for the car price increase 29 signaled. The sensor 33 works with a very much better local resolution as if send/receipt mechanism 32 and transponder 21, so that the control command, performed in the case of example the command, designated of the received code, becomes the carriage 2 to continue, exact at the correct location. For this the car price increase 29 turns the drive motor of 8.

[0034] If the carriage 2 is to drive on, then its car price increase 29 from the central control 25 becomes and/or. the responsible range CONTROLLER 26 over the bus 14 a corresponding addressed command supplied. The car price increase 29 bestromt now the drive motor 8 again, so that the carriage drives on 2 first free, until it meets new informations a new transponder 21 and receives from this

[0035] The free travel of the carriages 2 becomes additional by the distance sensors 17 controlled mounted at the single carriages 2. If a certain minimum distance is fallen below to the leading carriage 2, the speed of the respective carriage becomes 2 corresponding reduced; if necessary, becomes the carriage 2 also stopped, to itself the leading carriages 2 again moved.

[0036] With the described above embodiment a transponder 21 and an additional local marking were 20 mounted at a

location of the support rail 1, at which on the car price increases 29 influence taken was to become, both. This increased, like already mentions, the accuracy of the location, on which the influencing control happens. If it depends however on a large local accuracy less, can be done without the sensor 33 and the local marking 20. In this case the car price increase leads 29 immediate after receipt of an appropriate signal of sends/receipt mechanism 32 the command predetermined by the received code.

[0037] The data link between the central control 25 and the single car price increases 29 possible except the already described functions a program down load, a central Download of the vehicle parameters, the FU-parameter, the system dependent driving, positioning and load change tables, a synchronization with other vehicles and conveyor lines as well as central version control

Claims of EP1216910

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1. Conveyor, in particular electrical overhead conveyor, to the conveyance of items also

a) a way system, in particular mounting rail system;
b) a plurality of carriages, which are more movable guided and in each case exhibit a drive motor on the way system;
c) a central control, which steers the movement of the carriages on the way system and coordinated; how
d) the way system at least a location exhibits, at which an influencing control is required on a carriage located in this place,

characterised in that
e) the way system (1) at the locations, is required at which an influencing control on the carriages (2), an code-inertial (21) exhibits, a selectable, a certain action of the carriage (2) coding code carries;
f) each carriage (2) exhibits:

company) a code reading device (18), which with that code-inertial (21) cooperates;
b) a car price increase (29), which the signals of the code reading device (18) evaluates implements.
coded action of the carriage (2) evaluates implements.

2. Conveyor according to claim 1, characterised in that each car price increase (19) over a data bus (14) with the central control (25) communicated.

3. Conveyor according to claim 1 or 2, characterised in that each car price increase (29) over a sliding contact (30) with the data bus (14), formed as Schleifleitung, in connection stands.

4. Conveyor after one of the preceding claims, characterised in that that code-inertial a transponder (21) enclosure, which exhibits a memory, in which the code stored is, and that the code reading device sends one/to receipt mechanism (18) enclosure, which queries the transponder (21).

5. Conveyor after one of the claims 1 to 3, characterised in that that code-inertial a bar code carries and the code reading device a bar code read head exhibits

6. Conveyor after one of the preceding claims, characterised in that each carriage (2) a distance sensor (17) exhibits, that the distance to the leading carriage (2) monitored.

7. Conveyor after one of the preceding claims, characterised in that at least a location of the way system (1), is required at which an interference of the carriage (2), except which code-inertial (21) is a local marking (20) arranged and that each carriage (2) is provided with corresponding sensor (33), which cooperates with the local marking (20), whereby the action, which becomes coded by the code transmitted of the code reading device (18) to the car price increase (29), only then performed becomes if the sensor (33) responded to the local marking (20).

8. Conveyor according to claim 7, characterised in that the local marking (20) a piece metal sheet is

9. Conveyor according to claim 7, characterised in that the local marking a field with a bright one/a dark border is.

10. Conveyor after one of the preceding claims, characterised in that each car price increase (29) a controller with memory contains, in which codes are and of the code coded actions stored and corresponding are verfiziert.

11. Conveyor after one of the preceding claims, characterised in that of the central control (25) several range CONTROLLEPs (26) subordinate are, become managed over which certain portions of the way system (1) in each case.

12. Conveyor after one of the preceding claims, characterised in that the central control (25) and/or the range CONTROLLEPs (26) a memory contain, in which codes are and of this code coded actions stored.

13. Conveyor after one of the preceding claims, characterised in that it a free manageable code-inertial covers, in which the characteristic data of a carriage (2) is storable and which cooperates with the code reading device (18) of a new carriage (2), introduced into the conveyor, to its initialization

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